of anæmia. This condition is also greatly favoured, in all probability, by the failure of the globule-making function of the gland. As the destruction of the globules proceeds, their red matter is converted into pigment, which pigment, in its various forms, is carried into the vascular apparatus of the body. Deposited in the liver it may accumulate to such an extent finally as to impede the portal circulation and give rise to diarrhœa and ascites. Lodged in the vessels of the kidneys, and especially in the Malpighian bodies, it may cause a like impediment in those organs, and there is developed a true albuminuria with its consequent anasarca. In the third case given above we had all these conditions. Pigment in the liver, with diarrhœa and ascites. Pigment in the kidneys, with albuminous urine and anasarca.

The lessons as to treatment to be drawn from these discoveries are simple. The beneficent action of cinchona can scarcely be raised higher than before, but its precise mode of action is more clearly developed. Its antiperiodic power is that which makes it invaluable. By cutting off the paroxysms it prevents the repeated congestions and stagnations of blood in the spleen, and thus arrests the destruction of the blood in that organ, and the consequent production of pigment, which is the obstructive agent carried into the more distant organs of the body. The one most valuable therapeutic law taught by these facts is the necessity of applying the saving agent early in the case. When so used it averts the disastrous effects of repeated paroxysms, and thus saves life as clearly and distinctly as does a surgical operation in a case where no other course of procedure is possible. Reason deduces this result as plainly in the former case as the eye beholds it in the latter.

ART. II.—*On Tetanus Nascentium.* By J. LEWIS SMITH, M. D., Physician to the Infant Asylum; Physician to the Prot. Epis. Orphan Asylum, New York.

TETANUS NASCENTIUM, or, as it is sometimes called, tetanus neonatorum, or tetanus infantum, is one of the most interesting diseases of infancy. It stands first in point of time, in the long catalogue of fatal maladies; its advent is sudden and unexpected; life promising well, for such infants are usually robust, is destroyed in a few hours, turning the joy of parents into sorrow, and blasting their seemingly well-grounded expectations. Tetanus nascentium is also not a rare complaint, although it is more frequent in some localities and in some conditions of life than in others. In this city it is more common than tetanus at any other age, or indeed in all other ages, since, according to the reports of the City Inspector, more die from tetanus in the first year of life than subsequently, and every physician knows that death from this disease, in the nursing infant, occurs, with very few exceptions, in the first two weeks of life.

Interesting and important as is tetanus nascentium, it must be confessed that our knowledge of it is much more limited and imperfect than it should be, when we consider what great advancement has been made in pathological inquiries during the present century. Our knowledge in reference to the causation, symptoms, and proper treatment of this disease, is not much superior to that of M. Dazille or Dr. Joseph Clarke, who lived before the year eighteen hundred.

Did we better understand the pathology of diseases in the new-born, or could we more accurately ascertain the condition of organs at this age, doubtless we should occasionally consider those phenomena, which we now designate as a disease, *per se*, under the title tetanus nascentium, as symptoms of some other affection. But as the tetanic rigidity and spasms in the new-born occur so abruptly, masking all other symptoms, and ordinarily ending so speedily in death, without our knowing certainly whether or not there is any antecedent disease, it seems eminently proper that we should recognize the state in which such muscular rigidity occurs, with such a rapid result as an independent affection.

This explanation is required from the fact that I have added to my collection of cases one from Billard, which this observer relates under the head of spinal meningitis.

I have felt more fully justified in employing the records of this case from the fact that others have recorded very similar cases as examples of tetanus nascentium. In Billard's case, an infant, three days old, was attacked with convulsions. "His limbs were rigid and violently bent; the muscles of the face were in a continual state of contraction." On the following day "the convulsions continued; * * * the body remained rigid, and the vertebral column, which the weight of the trunk will cause to bend, with the greatest ease, in a young infant, remained straight and immovable, whenever the child was raised." At the autopsy, in addition to the meningital apoplexy, which is commonly present in those who have died of tetanus nascentium, a thick pellicular exudation was found on the spinal arachnoid. This case certainly presented the symptoms and history which are characteristic of tetanus nascentium.

Fatal Cases.

Case 1. Male; taken when three days old; lived sixty hours. Labatt, Edin. Med. and Surg. Jour., April, 1819.
" 2. Female; taken when three days old; lived forty hours. *Ibid.*
" 3. Taken when five days old; lived fifty hours. *Ibid.*
" 4. Taken when three days old; lived one day. *Ibid.*
" 5. Male; taken when two days old; lived two days. Billard, Treatise on Diseases of Children, Stewart's trans., p. 477.

Case 6. Male; taken when three days old; lived two days. Romberg.
" 7. Male; taken when six days old; lived ninety-three hours. Dr. Imlach, Month. Jour. of Med. Sci., Aug. 1850.
" 8. Female; taken at five days; lived four days. Caleb Woodworth, M. D., Boston Med. and Surg. Jour., Dec. 13, 1831.
" 9. Negro; taken at seven days; lived twenty-four hours. P. C. Gaillard, M. D., South. Jour. of Med. and Pharm., Sept. 1846.
" 10. Male; taken when seven days old; lived one day. Augustus Eberle, M. D., Missouri Med. and Surg. Jour., 1847.
" 11. Taken when seven days old. D. B. Nailer, N. O. Med. Jour., Nov. 1846.
" 12. Male; taken when three days old; lived one day. N. O. Med. and Surg. Jour., May, 1853.
" 13. Negro; taken when three days old; lived three days. Rob't H. Chinn, M. D., N. O. Med. and Surg. Journal.
" 14. Taken when two days old; died in four hours after the doctor's visit. *Ibid.*
" 15. Taken when seven days old; lived one day. C. H. Cleaveland, New Jersey Med. Rep., April, 1852.
" 16. Negro; taken when seven days old; death finally. Greensville Dowell, Amer. Jour. of Med. Sci., Jan. 1863.
" 17. Taken when twelve days old; lived one day. Thos. C. Boswell, communicated to Dr. Sims. Amer. Jour. of Med. Sci., April, 1846.
" 18. Taken when about five days old; died at about the age of nine days. B. R. Jones. *Ibid.*
" 19. Taken at or soon after birth; lived two days. Dr. Sims, Amer. Jour. of Med. Sci., April, 1846.
" 20. Taken at the age of six days; lived one day. *Ibid.*
" 21. Taken when three days old; lived two days. *Ibid.*
" 22. Male; taken at the age of eight days; died in three hours. Communicated to the writer.
" 23. Taken at the age of twelve hours; lived two days. Communicated to the writer.
" 24. Female; taken when seven days old; lived forty-five hours. The writer.
" 25. Male; taken at the age of seven days; lived about forty-eight hours. *Ibid.*
" 26. Female; taken at the age of eight days; lived three days. *Ibid.*
" 27. Female; taken at the age of five days; lived three days. *Ibid.*
" 28. Female; taken when four days old; lived two days. *Ibid.*
" 29. Taken when six days old; died next day. *Ibid.*
" 30. Taken when five days old; lived twenty-four hours. *Ibid.*
" 31. Taken when eight days old; lived two days. *Ibid.*
" 32. Male; taken when five days old; lived one day. *Ibid.*

Favourable Cases.

Case 1. Negro; female; taken when three days old; recovered in a few days. Rob't S. Bailey, Charleston Med. Jour. and Rev., Nov. 1848.
" 2. Negro; taken at eleven days; recovered in fifteen days. W. B. Lindsay, N. O. Med. Jour., Sept. 1846.

Case 3. Negro; taken when ten days old; recovered in thirty-one days. P. C. Gaillard, Charleston Med. Jour. and Rev., Nov. 1853.
" 4. Male; taken at the age of eight days; recovered in twenty-eight days. *Ibid.*
" 5. Negro; taken at seven days; recovered in fifteen days. Augustus Eberle, Missouri Med. and Surg. Jour., 1847.
" 6. Taken when eight days old; recovered in four weeks. Furlong, Edin. Med. and Surg. Jour., Jan. 1830.
" 7. Taken at the age of one week; recovered in two days. Dr. Sims, Amer. Jour. of Med. Sci., April, 1846.
" 8. Female; taken at the age of three days; recovered in five weeks. The writer.

Period of Commencement.—Finckh, who saw cases of tetanus nascentium in the Stuttgard Hospital, states (*Hecker's Annalen*, vol. iii., No. 3, page 304) that it began in one case on the second day, in eight on the fifth, and in seven on the seventh.

Prof. Cederschjold, of Stockholm, treated forty-two cases in hospital practice, in 1834, and in these cases it usually commenced between the ages of four and six days; Copland says (*Medical Dictionary*) that it generally commences in the first seven or nine days after birth, and rarely later than the fourteenth. Romberg says that it commences between the fifth and ninth days. In two hundred cases observed by Reicke, in Stuttgard, in the course of forty-two years, it was never found to commence before the fifth, rarely after the ninth, and never after the eleventh day. Schneider says, that the disease occurs oftenest between the second and seventh, and rarely after the ninth day. In six cases reported by Dr. C. Levy, of Copenhagen, it began in two on the third day, in two on the fifth, and in two on the sixth. Dr. Greensville Dowell (*American Journal of Medical Sciences*, Jan. 1863), who has seen much of the disease among the negroes in Mississippi and Texas, says it is almost sure to come on between the fifth and twelfth days after birth. In the forty cases collected by myself, the disease began as follows:—

Age.	Cases.
One day or under	2
Two days	1
Three "	9
Four "	2
Five "	6
Six "	3
Seven days	8
Eight "	6
Ten "	1
Eleven "	1
Twelve "	1

Very rarely, as will be seen hereafter, tetanus nascentium begins at, or so soon after birth, that it may be properly called congenital.

Frequency in Certain Localities.—Tetanus nascentium occurs probably in all countries, but it does not add greatly to the mortality, except in certain localities. Some of the eminent British and Continental physicians confess to have seen so few cases, that they have almost no personal knowledge of the disease. On the other hand, there are, or have been places in every zone, where it is, or has been so prevalent, as to sensibly check the increase of population. The attention of the profession, more than half a century since, was directed to the prevalence of tetanus nascentium in the Island of Heimacy, off the coast of Iceland. On this island, scarcely an infant escaped, while on the mainland, scarcely one was affected. Heimacy, the product of volcanic action, of small extent, and almost destitute of vegetation, supports a scanty population. The inhabitants live chiefly on the flesh and eggs of the sea fowl, and are filthy and degraded in their habits. About the year 1810, the Danish Government deputed the land-physicus of Iceland to visit Heimacy, and ascertain the nature of the disease, which was so destructive to the infants. Although this gentleman from his brief stay saw no case himself, he obtained interesting particulars in reference to the disease, especially its great mortality from the priests and parents. At this time scarcely an infant escaped. Again, according to Dr. Schleisner, whose observations in reference to the same locality were made about fifteen years ago, this disease was still the most fatal of all infantile affections.

Tetanus nascentium is also represented as very fatal in the Island of St. Kilda, off the coast of Scotland. In the temperate regions of America and Europe, cases are not frequent, except occasionally in the poor quarters of the cities, in foundling hospitals, and rarely in country towns, where the conditions are favourable. The records of the Dublin, Stuttgard, and Stockholm Lying-in Asylums furnish many cases. In the town of Fulda, Germany, in 1802, Dr. Schneider saw six cases in fourteen days, while a midwife in the same place stated that she had seen more than sixty in nine years.

But the greatest mortality is in the warm climates, both of the Eastern and Western Hemispheres. In the West Indies, the Southern portion of the United States, the equatorial regions of South America, and in the islands of Minorca and Bourbon, it has, in many localities, been the most frequent and fatal of infantile maladies.

It is an interesting fact, that in the warm regions the victims are chiefly negro infants. L. S. Grier, M.D., of Mississippi, says, in the *New Orleans Medical and Surgical Journal*, May, 1854: "The first form of disease which assails the negro among us is trismus. The mortality from this disease alone is very great. No statistical record, we suppose, has ever been attempted, but, from our individual experience, we are almost willing to affirm that it decimates the African race upon our plantations within the first week of independent existence. We have known more than one instance in which, of the births for one year, one-half became the victims of this disease, and that, too, in spite of the utmost watchfulness and care on the part of both planter and physician. Other places are more fortunate, but all suffer more or less; and the planter who escapes a year without having to record a case of trismus nascentium may congratulate himself on being more favoured than his neighbours, and prepare himself for his own allotment, which is surely and speedily to arrive." Dr. Wooten (*New Orleans Medical and Surgical Journal*, May, 1846), says, "It is a disease of fatal frequency on the cotton plantations in this section of Alabama." He has, however, never seen a white child affected with it.

In New Orleans, according to the death statistics in our possession, which, however, relate to only one year, tetanus nascentium is the most fatal of all diseases except phthisis. Mr. Maxwell says, in the *Jamaica Physical Journal* (copied in the *London Lancet*, April 11, 1835): "From observations that I have made for a series of years * * I found that the depopulating influence of trismus nascentium was not less than twenty-five per cent. It scarcely has a parallel within the bills of mortality." This gentleman's observations relate to the West Indies. Similar testimony comes to us from Cayenne and Demerara.

It is seen that the disease prevails in regions wide apart, and presenting very diverse climatic conditions; but there is a similarity, as regards the personal and domiciliary habits of the people, where its ravages are most felt. It occurs chiefly among those who are filthy and degraded in their habits, who live either from choice or necessity in neglect of sanitary requirements. And this fact aids us in an understanding of the subject which we shall next consider, namely—

Causes.—That uncleanliness and impure air are a cause of tetanus nascentium is as fully demonstrated as most facts in the etiology of diseases. The attention of the profession was forcibly directed to this cause by Dr. Joseph Clarke, in a paper read before the Royal Irish Academy in 1789. This physician was in charge of the Dublin Lying-in Asylum, and had rightly concluded that the great mortality among the new-born infants was due mainly to imperfect ventilation. Through his advice apertures, twenty-four inches by six, were made in the ceiling of each ward; three holes, an inch in diameter, were bored in each window frame; the upper part of the doors leading into the gallery were also perforated with sixteen one inch apertures, and the number of beds was reduced. The result of these simple sanitary regulations may be seen from Dr. Clarke's own statement. He says: "At the conclusion of the year 1782, of 17,650 infants born alive in the Lying-in Hospital of this city, 2,944 had died within the first fortnight, that is, nearly every sixth child." The disease in nineteen cases out of twenty was tetanus nascentium. After the wards were better ventilated, namely, from 1782 till the time of the preparation of Dr. Clarke's paper, 8,033 children were born in the hospital, and only 419 in all had died, or about one in nineteen. So impressed was Dr. Evory Kennedy, who, at a later period, had charge of the same asylum, with the belief that Dr. Clarke had discovered the true cause, and had been able in a great measure to prevent it, that he exclaimed with enthusiasm: "If we except Dr. Jenner, I know of no physician who has so far benefited his species, making the actual calculation of human life saved the criterion of his improvements." The ten cases occurring in my own practice, and which are employed in the statistics of this paper, were all met in tenement-houses or shanties, where habits of cleanliness are impossible, and I have not yet seen or heard of a case in the better class of domiciles. The statements of physicians in the Southern States, who speak from extensive observation among the negroes, are strongly corroborative of the idea that the disease is, in great measure, due to the cause which we are considering.

Dr. Greensville Dowell, residing in Brazoria County, Texas, believes that he has sometimes been able to trace the disease to the old bedclothes saturated with excrementitious matters, which are found in the negro cabins. In a well-written paper, published in the *Nashville Journal of Medicine and Surgery*, June, 1851, by Prof. John M. Watson, the frequency of the disease among the negroes is accounted for as follows:—

> "When called to see their children we find their clothes wet around their hips, and often up to their armpits, with urine * * *. The child is thus presented to us, when, on examination, we find the umbilical dressings not only wet with urine, but soiled likewise with feces, freely giving off an offensive urinous and fecal odour, combined at times with a gangrenous fetor, arising from the decomposition, not desiccation of the cord."

Another cause is believed to be some irritation in the bowels, as from retained meconium. Observers in the Southern States, and elsewhere, occasionally mention this as a cause. In one case, treated by myself, there was obstinate constipation immediately before the attack, and in another diarrhœa preceded; and this or the state which produced the diarrhœa, was the only apparent cause of the disease.

In other cases the only assignable cause is exposure to wet or cold, or changes in temperature. Prof. Cederschjold attributed the epidemic, which he observed in Stockholm, to a sudden change of temperature, from hot weather, in May, to frosty, in June. In a case related by Dr. P. C. Gaillard, of Charleston, in the *Southern Journal of Medicine and Pharmacy*, September, 1846, the disease commenced as follows: The nurse came in with wet apron and clothes, in the evening, a short time after she had taken the child into her lap, it sneezed violently two or three times. At 10 P. M. tetanus began. The disease in certain localities on the continent is said to be more frequent where there is no parish church, in consequence of exposure in carrying infants to be christened. The influence of the weather, in the production of tetanus nascentium, is also shown by facts observed in the Stuttgard Hospital. In an aggregate of twenty-five cases, treated in that institution, all but three occurred in the cold months. In the Island of Cayenne, at a hamlet surrounded by mountains and dense forests, tetanus attacked only one in every twelve or fifteen of the infants. After a great part of the forests had been cut down, so as to allow access to the cold sea winds, almost all the new-born infants fell victims to tetanus (Insel. Cayenne).

Hein relates, that a citizen of Berlin lost successively two children with tetanus nascentium. When the second child fell ill he observed that its cradle was exposed to a current of air. At the third accouchement the position of the cradle was changed, and the infant escaped. Exposure to wet and cold has been long recognized as a cause of the disease. Sauvages, many years ago, said, "Hic morbus hieme et cum aurâ humidâ saepius advenit quam sicca aestate." (*Nosol. Method.*, vol. i. p. 531.)

The causes of tetanus nascentium enumerated above may be proximate or remote; may produce the disease, by their direct effect on the system, or by producing a pathological state, which, in turn, leads to the development of the disease. There are other causes, which are always proximate, namely, organic alterations. In the bodies of those who have died of this disease, structural changes are found, which doubtless result from the spasms, and sometimes other abnormal states of organs, which, from their nature, could not be a result, and which being observed in different cases, must be regarded as proximate or immediate causes. The most frequent of such lesions is inflammation of the umbilicus and umbilical vessels.

Moschion, who lived in the first century of the Christian era, stated in writings still extant, that stagnant blood, in the umbilical vessels, sometimes produced dangerous disease in the new-born infant, and it is supposed that he referred to cases of tetanus infantum. In modern times the attention of the profession was more particularly directed to this cause, by a paper published by Dr. Colles, in the first volume of the *Dublin Hospital Reports*, in 1818. The observations published in this paper were made in the Dublin Lying-in-Hospital, during the period of five years. In each of these years he had witnessed from three to five post-mortem examinations in cases of infantile tetanus, and the lesions, he states, were in all much alike, as follows: The floor of the umbilical fossa was lined by a membrane apparently formed by suppurative inflammation, and in the centre of this fossa was a large papilla. This papilla consisted of a soft yellow substance, apparently the product of inflammation, and in all the cases the umbilical vessels were in contact with this substance, and were pervious. In a few instances superficial ulcerations were found near the mouth of the umbilical vein, and occasionally the skin, surrounding the umbilicus, was raised. The peritoneum covering the vein was highly vascular, though often not to a greater distance than an inch above the umbilicus; sometimes as far as the fissure of the liver. The peritoneum in the course of the umbilical arteries presented the inflammatory appearance, in still greater degree, often as far as the sides of the bladder. The cellular substance lying along the arteries and urachus, anteriorly, was loaded with a yellow watery fluid. The inner surface of the umbilical vein was not inflamed, but its coats, in general, were thickened. On slitting open the arteries a thick yellow fluid, resembling coagulable lymph, was found within their coats, and in all cases these vessels were thickened, and hardened as far as the fundus of the bladder.

Dr. Finckh, who observed twenty-five cases in the Stuttgard Hospital, believes that the most frequent cause was suppuration, or ulceration of the umbilical cord. In ten of the twenty-five cases, the navel was dry and cicatrized; in the remainder, it was either wet or swollen, with a bluish red inflamed edge at the margin of the navel; a dirty viscid pus covered the umbilical depression. In all cases, in which the navel was not completely healed, it had a peculiar discoloured appearance.

Dr. Levy, physician of the Foundling Hospital, in Copenhagen, attended twenty-two cases in that institution, in 1838 and '39. Of these, twenty died, and fifteen were examined carefully after death. In fourteen there were decided marks of inflammation in the umbilical arteries, especially in those portions lying along the urinary bladder; in several cases the peritoneum over the arteries was much injected, and in three adherent either to the omentum or intestine by coagulable lymph; the coats of the arteries were thickened, their cavities dilated, and containing more or less dark reddish-brown, or greenish puriform matter, always fetid. Sometimes the arterial tunica interna was found ulcerated, and absent in places, and there was spongy thickening of the subjacent cellular tissue. In two cases the ulcerative process had extended from the tunica interna to the peritoneum, and in one had perforated even the peritoneum, producing a deposit of thick ichorous matter around the opening; in one case both arteries were so softened that their coats were scarcely distinguishable, and in another these vessels had become gangrenous. The appearance of the umbilicus was unchanged in four cases; in ten the fundus was red, and filled with puriform fluid, which quickly reappeared when removed, and in general, shortly before death, the navel presented a greenish colour.

According to Romberg, Dr. Schöller made post-mortem examinations in eighteen cases of tetanus nascentium, and in fifteen found inflammation of the umbilical arteries. These vessels were swollen near the bladder, in one case to the diameter of four lines, and were found to contain pus. The lining membrane was eroded, or covered with an albuminous exudation. Both arteries were not always equally inflamed, and in three cases only one was affected.

Schneeman found minute points of suppuration in the umbilical vein, in eight cases (*Holscher's Annalen*, vol. v. p. 484, 1840), and pus throughout the course of this vessel in one.

The observations mentioned above were made for the most part in hospitals on the continent, but there is a large amount of similar testimony furnished by physicians in private practice. M. Boiran, of the Isle of Bourbon, says he has found in every case inflammation around the umbilicus (*Gazette Médicale*, Paris, July 11, 1841). Dr. John Furlonge (*Edin-*

burgh Medical and Surgical Journal, January, 1830), who resided at St. Johns, Antigua, attributes the disease to improper dressing of the umbilicus. The same opinion is expressed by Mr. Maxwell, who also saw the disease in the West Indies (*Jamaica Physical Journal*, copied into the *London Lancet*, April 11, 1855). Dr. Ransom states, in a communication to Prof. John M. Watson (*Nashville Journal of Medicine and Surgery*, June, 1851), that he has never seen a case of tetanus nascentium, in which the umbilicus was healthy. In a case related by Robert S. Bailey, in the *Charleston Medical Journal and Review*, Nov. 1848, there was a hard scab on one side of the umbilicus, and this part was much distended. A discharge followed the removal of the scab, and the child recovered. In a favourable case, related by W. B. Lindsay, in the *New Orleans Medical and Surgical Journal*, Sept. 1846, the umbilicus was tumid, and not disposed to heal. Dr. H. O. Wooten (same Journal, May, 1846) attributes the disease to the condition of the umbilicus and umbilical vessels, and states that he has found the umbilicus gangrenous. A case is also narrated in the *New Orleans Medical and Surgical Journal*, May 1, 1853, in which the umbilical vessels were blocked up by purulent matter. Robert A. Chinn, M. D., Brazoria, Texas (*New Orleans Medical and Surgical Journal*, Sept. 1854), believes one cause of the disease to be improper tying and management of the umbilical cord, by which a diseased state is produced, which extends to the umbilicus and thence to the viscera. Dr. Dowell, of Texas, relates, in the *American Journal of the Medical Sciences*, January, 1863, a case in which the umbilicus was healed, but there was dark blood in the umbilical vein, and yellowness around the navel. Since observing this case, he has several times made post-mortem examinations, and in the majority of cases has found the same state of the umbilicus. At a meeting of the Obstetrical Society of Edinburgh, April 24th, 1850, Dr. Imlach related a case in which there was a dark and gangrenous appearance of the integument around the umbilicus, and the peritoneum underneath was also dark but not inflamed; umbilical vein healthy; a little fibrin in the left umbilical artery; right umbilical artery much diseased; its two inner coats apparently destroyed, and in their place a yellow pultaceous slough, in which pus-globules were discovered with the microscope.

It is evident that the pathological state of the umbilicus and umbilical vessels, described above, and which has been noticed by so many observers, in different countries, cannot result from the tetanus, for there is nothing in this affection which can possibly develop an inflammation. And if this were possible, so extensive lesions, as have sometimes been observed, would not be likely to occur in the short space of one or two days. The belief that these lesions precede and produce the tetanus is strengthened by well-known facts in reference to tetanus in the adult, since the state of the umbilicus in the one period of life is analogous to the wounds which produced tetanus in the other. It is still further strengthened by the fact, which will appear further on in this paper, that tetanus nascentium, from being frequent in certain localities, has become infrequent through greater care in dressing and managing the umbilical cord.

But there are cases of tetanus nascentium in which there is no disease in or about the umbilicus. Dr. Finckh, of Stuttgard, made careful examination of the umbilical vessels in eleven cases, without discovering any pathological change. Dr. Samuel B. Labatt, Master of the Dublin Lying-in Hospital, published in the *Edinburgh Medical and Surgical Journal*, April, 1819, a paper entitled "An Inquiry into an Alleged Connection between Trismus Nascentium, and Certain Diseased Appearances in the Umbilicus." This paper was designed as a reply to the essay of Dr. Colles. Dr. Labatt relates several cases, in which there was no disease of the umbilicus and umbilical vessels, and others, in which the disease was so slight that it probably produced no injurious effect on the health of the child. Dr. James Thomson, who spent considerable time in the tropical regions, says (*Edinburgh Medical and Surgical Journal*, Jan. 1822): "I have, myself, examined nearly forty cases of infants that have sunk under the complaint. In many, I have looked at no other part but the navel, and have found it in all states; sometimes perfectly healed, especially if the infants had lived several days; at other times a simple clean wound. When death occurred on the fifth or sixth day, the wound was frequently in a raw state. I never yet saw it in a sphacelated condition." This writer concludes from his observations, that there are cases in which the cause is located elsewhere than in the umbilical region. In the *Dublin Journal of Medical and Chemical Science*, Jan. 1836, Dr. John Breen, criticizing the theory which locates the cause of tetanus nascentium in the umbilicus and umbilical vessels, remarks: "From dissections * * we have never been able to discover any peculiar morbid appearance which would justify us in offering any explanation of the pathology of the disease." In our own cases there was no evidence of disease of the umbilicus or umbilical vessels, so far as could be ascertained by external examination, and in one (No. 32) a careful post-mortem examination disclosed no lesion of these parts.

The inference from the above observations evidently is, that although umbilical disease is a frequent cause of tetanus nascentium, cases occur in which such disease is not present, and we must look for some other cause. From the nature of tetanus nascentium, the attention of observers has been largely directed to the nervous system, in the belief that sufficient cause of the disease might be found located there, and occasionally the correctness of this belief has been shown by post-mortem examinations.

We have alluded, in another connection, to a case from Billard, in which tetanic rigidity occurred in an infant three days old, as the result of spinal meningitis. That tonic spasms not infrequently occur in older children, in consequence of meningeal inflammation, is well known, and in some of the reported epidemics of tetanus nascentium, meningitis was really present, and was probably the sole cause. Such an epidemic was observed by Prof. Cederschjold in Stockholm, in 1834. Within a few months, he treated forty-two cases, and in addition to the lesions, which are known to result from tetanus, there was found, in those examined after death, a plastic exudation at the base of the brain. Finckh, of Stuttgard, made twenty post-mortem examinations of those who had died of this disease, and in nine found spinal meningeal inflammation.

Meningitis in the new-born infant is, however, comparatively rare, and we must therefore regard it as not a common cause of tetanus.

Here comes up an interesting question, and one which a few years since attracted much attention. Can injury of the brain, or medulla oblongata from displacement of the cranial bones, during the birth of the child, or in consequence of pressure on the head from position after birth cause tetanus nascentium?

In 1846, there appeared from the pen of Dr. Sims, then practising at Montgomery, Ala., a paper designed to show that this disease is produced by pressure, exerted on the nervous centre through depression of the occipital bone. In 1848, the same writer published a second paper, also in the *American Journal of Medical Sciences*, fully enunciating his theory as follows: "That trismus nascentium is a disease of centric origin, depending on a mechanical pressure exerted on the medulla oblongata, and its nerves; that this pressure is the result, most generally, of an inward displacement of the occipital bone, often very perceptible, but sometimes so slight as to be detected with difficulty; that this displaced condition of the occiput is one of the fixed physiological laws of the parturient state; that when it persists for any length of time after birth, it becomes a pathological condition, capable of producing all the symptoms characterizing trismus nascentium, which are instantly relieved simply by rectifying this abnormal displacement, and thereby removing pressure from the base of the brain." In both papers cases are narrated in support of this theory, but there are serious objections to this mode of explaining the occurrence of the disease. In the first place, if this explanation were correct, tetanus ought ordinarily to occur sooner, for the occiput is as much depressed previously, and in the majority of cases more depressed, than at the period when it does actually commence. Compression of the medulla would certainly be followed by immediate and marked symptoms, instead of an immunity for four or five days.

Again, well-known facts, in reference to the causation of tetanus nascentium, conflict with Dr. Sims' theory, as epidemics of the disease, its prevalence in one locality, and absence in another, although no particular attention is given to the position of the infant, the diminution of the number of cases by greater attention to cleanliness, of which there is abundant proof. Besides, there are many cases of tetanus nascentium, at the commencement of which there is no perceptible displacement of the occipital bone, and no scientific inquirer should assume to exist what is not apparent in order to support a theory.

A careful examination of the cases of Dr. Sims must convince any one who has seen much of the disease that there is no certainty that several of them are genuine, and there is a strong probability that some are not. Besides, other physicians have not derived that benefit from placing the infant on the side, which would be likely to result were the theory of Dr. Sims correct.

After the publication of Dr. Sims's papers, the attention of physicians in the Southern States, who saw much of infantile tetanus among the slaves, was directed to an examination of the correctness of his views, and though a few wrote approvingly of them, in the belief that his explanation held good in some cases, they were rejected by the majority. Drs. P. C. Gaillard (*Charleston Medical Journal and Review*, Nov. 1853), Wakly (*New Orleans Medical and Surgical Journal*, 1849), and Grafton (*New Orleans Medical and Surgical Journal*, July, 1853) relate cases in which there was no evidence of occipital displacement. In my own cases depression of the occipital bone was sometimes noticed, occasionally to a considerable extent, but in no instance did this depression seem to be a cause, but a result, and it became more and more marked as the disease advanced.

The correct explanation of the inequality of the cranial bones, sometimes observed in tetanus nascentium, is probably as follows: If the new-born infant becomes emaciated, the volume of the brain is diminished, like that of the trunk or limbs, and the sinking of the occipital bone simply corresponds with the amount of waste in the cerebral substance. Whatever the disease in the young infant, if there is much emaciation, the parietal bones will usually be found more prominent than the occipital. Now, in fatal tetanus nascentium emaciation is very rapid; those fleshy and plump, if the disease do not speedily end, become pinched and wrinkled. Viewed in this light, the occipital depression, so far as it has any effect, must be regarded as conservative. It prevents serous effusion, which, in a similar state of waste, occurs in older children, whose cranial bones are consolidated.

Hence the theory of Dr. Sims cannot be accepted; and yet there are a few cases on record in which tetanus seemed to be due to injury received at birth. Dr. Sims has related one such case, that of a negro infant. The mistress, an observing lady, gave to Dr. Sims the following account of it: Its head "was mightily mashed. . . . The bones seemed to be loose. I got it to take a little boiled milk on the first day; but it swallowed very little, and very badly, for its jaws seemed to be locked. On the next day it took spasms, and got stiff all over; its hands were shut up tight, and its arms were bent up so (she placed her forearms at right angles). Every time I touched it the spasms would get worse all over, screwing up its face till it was the ugliest thing in the world; and when the spasms went off, it looked as well in the face as any new-born baby. But then the stiffness never left it, and the spasms kept coming and going till it died." It lived two days.

It is evident, from the description of the mistress, that this was a case of tetanus nascentium, commencing at, or so soon after birth, that it was really congenital. The apparent cause was injury of the head, occurring in consequence of protracted birth; the infant was resuscitated with difficulty after several minutes.

Dr. W. C. Sutton published a similar case in the *Nashville Journal of Medicine and Surgery*, April, 1853. The infant, at birth, was apparently dead, but was resuscitated so as to live eighteen hours in a state of tetanic rigidity. In these cases of congenital tetanus, doubtless, the cerebro-spinal axis is in some way affected; but, in the absence of *post-mortem* examinations, the exact nature of the injury is uncertain.

It is evident, then, that tetanus nascentium cannot be ascribed, abstractly considered, to any one cause. On the other hand, in different cases, the causes may be essentially distinct; so that the disease, as regards causation, corresponds with eclampsia in older children. Dr. James Johnson, many years ago, expressed his belief in the multiplicity of causes, and he had been a careful and intelligent observer in the West Indies.

The causes may be arranged in two groups, one external, the other internal. In the first group may be placed imperfect ventilation, personal and domiciliary uncleanliness, and atmospheric vicissitudes; in the second group, so far as ascertained, inflammation of the umbilicus and umbilical vessels, meningitis, and, rarely, injury of the cerebro-spinal axis during birth. It is highly probable that in a large proportion of cases an external and internal cause are both present, the external preceding and producing the internal, and the internal in turn producing the tetanus.

Lesions resulting from Tetanus.—The lesions resulting from tetanus nascentium, most frequently observed in those who have died of this disease, are chiefly such as are produced by the arrest of circulation, which, as will be seen, occurs especially in the paroxysms.

In the cases examined by Prof. Cederschjold, of Stockholm, already alluded to, the vessels and sinuses of the brain, and the brain and spinal marrow, were gorged with blood; heart and large vessels filled with blood.

Careful autopsies were made by Finckh in the Stuttgard hospital, in twenty cases, the bodies at death having been placed on their faces, in order to prevent any deceptive appearance from the gravitation of blood. In four there was no appreciable alteration in the spinal marrow or its membranes. In the remaining sixteen there was an effusion of blood, in considerable quantity, the whole length of the spinal canal, between the bony walls and the dura mater. It should be stated, however, that there was spinal meningeal inflammation in nine of the sixteen, though the effusion of blood did not probably result from the inflammation, but from the tetanus. The blood was very dark, sometimes fluid, at other times coagulated. In one case there was no change in the appearance of the brain or its membranes; in the remaining nineteen more or less extravasated blood was found on the surface of the brain or in its interior. The substance of the brain was healthy, as also its membranes, except the congestion. The only abnormal appearance observed in the thoracic and abdominal viscera was strong contraction of some portion of the intestinal tube in five cases.

Dr. West says: "The most frequent *post-mortem* appearance in these cases," referring to tetanus nascentium, "and that which I found in the bodies of all the four children whom I observed, consists of effusion of blood, either fluid or coagulated, into the cellular tissue surrounding the theca of the cord. Conjoined with this there is generally a congested state of the vessels of the spinal arachnoid, and sometimes an effusion of blood or serum into its cavity. The signs of congestion about the head are less constant, though much oftener present than absent, and sometimes existing in an extreme degree; while in one instance I found not merely a highly congested state of the cerebral vessels, but also an effusion of blood, in considerable quantity, between the skull and dura mater, and also a slighter effusion into the arachnoid cavity." Dr. Weber, of Kiel, also placed infants who had died of tetanus on their faces, and, without exception, found injection of the capillaries of the cord and spinal meninges, and extravasation of blood. M. Matuszynski, according to Bouchut, "has observed effusions of blood, of variable quantity, in the cerebral pia mater, in the ventricles, and in the choroid plexuses, with considerable injection of the membranes of the brain. He has also seen serous infiltration beneath the arachnoid, and serous effusion into the ventricles, accompanied by a diminution of the consistence of the cerebral substance." In two cases examined by myself, there was intense injection of the cerebral meninges and of the meninges of the upper part of the spine, but no extravasation was noticed. The spinal canal was not opened.

Dr. H. O. Wooten (*New Orleans Medical and Surgical Journal*, May, 1846) states that he has made several *post-mortem* examinations, and has found the pathological appearances as uniform as in any other disease, as follows: Engorgement of the substance of the brain, and of the meninges lining the base of the brain, the medulla oblongata, and spinal marrow; liver congested.

In a case related by Dr. Imlach before the Edinburgh Obstetrical Society, April 24, 1850, the upper part of the lungs was healthy, the posterior portion congested, and containing many dark points; heart and liver healthy; small intestines of a light-brown color; stomach and large intestines pale (there had been umbilical hemorrhage).

Romberg states that he found in a child, who had died of tetanus nascentium, such intense congestion of the veins and sinuses of the brain, that a slight touch, and the removal of the cranial bones, produced extravasation of the partly coagulated and partly fluid blood. Dr. Schöller, on the other hand, found actual extravasation of blood in the spinal canal in only one case in eighteen.

It is seen that while in some cases tetanus nascentium produces no sensible change in the condition of the viscera and vessels, it ordinarily causes great passive congestion, especially of the vessels of the cerebro-spinal meninges, and often extravasation.

Symptoms.—In many cases premonitory symptoms are absent, or are so slight as to escape notice. Sometimes there is a degree of fretfulness previously, but no more than is often seen in those who continue in good health. The first symptom which alarms the parents, and shows the grave nature of the commencing disease, is inability to nurse, or evident pain and hesitation in nursing. Commencing with rigidity of the masseters, the disease gradually extends to the other voluntary muscles, and in the course of a few hours the muscles of the limbs as well as of the trunk are involved. Persistent muscular contraction, which is the pathognomonic feature of the disease, is gradually developed in each affected muscle, so that it is not till after the lapse of several hours, perhaps even a day, that the greatest degree of rigidity is attained. Therefore, in the commencement of the disease, the limbs can be bent, and the jaws pressed open, by using a little force, though with manifest pain to the infant.

During the period of maximum rigidity, the jaws are fixed almost immovably, often with a little interspace between, against which the tongue presses, and in which froth collects. The head is thrown back, and held in one position by the stiffness of the cervical muscles. The forearms are flexed; the thumbs are thrown across the palms of the hands, and are firmly clenched by the fingers; the thighs are drawn towards the trunk; the great toes are adducted, and the other toes flexed. Occasionally opisthotonos results from the extreme contraction of the dorsal and posterior cervical muscles. The infant has sometimes been raised without any yielding of the muscles by one hand under the occiput and the other under the heels.

The rigidity is liable to variation in its intensity, even after the full development of the disease. If the infant is quiet, especially if asleep, the muscles are partially relaxed, to such an extent sometimes, in the first stages of the complaint, that the features have a placid and natural expression, though only for a short time. There are also frequent exacerbations in the muscular contraction, sometimes occurring without any apparent cause, and they are also produced by anything which excites or disturbs the child. Attempts to open the lips, or jaws, or eyelids, or to bend the limbs, blowing on the face, or even, sometimes, the alighting of a fly causes the paroxysm.

During the paroxysm the eyelids are forcibly compressed, as well as the lips, which are either drawn in or are pouting; the forehead and cheeks are thrown into wrinkles, and the physiognomy is indicative of great suffering. The unnatural positions of the trunk and limbs, which result from the muscular contraction, are increased for the moment; the head is more forcibly thrown back, and the limbs more strongly flexed. The muscular movements, which occur during the paroxysms, are often called clonic spasms. There is, indeed, occasionally some quivering of the limbs, and yet, as I have on different occasions noticed, so far from their being clonic spasms the tonic character continues, and is merely intensified. In fatal cases, as the disease advances, the paroxysms occur more frequently until the period of collapse or exhaustion is reached.

There is not in tetanus nascentium any loud crying of the child, however great the suffering. The cry is variously stated by different writers as "whimpering" or "whining." It is of this suppressed character, from the fact that the respiratory muscles are so affected as to render impossible those strong and rapid respiratory movements which are necessary in full utterance of the voice.

During the exacerbation respiration is suspended or rendered imperfect, and the circulation is retarded to such a degree that general capillary congestion results. The surface becomes of a deep red, almost livid appearance. Sometimes epistaxis occurs as a relief to this congestion, and sometimes, though less frequently, the blood forces itself from the congested liver along the umbilical vein and escapes from the umbilicus. We have already alluded to the rupture of the capillaries so often observed within or upon the cerebro-spinal meninges.

The frequency of the pulse and respiration varies somewhat in different cases, and at different stages of the same case. They are often somewhat accelerated, but at other times are natural or are even slower than in health.

While the appetite of the infant, to appearance, is not diminished, the pain which it experiences in nursing is such that alimentation is necessarily deficient. It can be fed with a spoon for a time after it ceases to take food in the natural way, but artificial feeding soon fails. The milk placed in its mouth is, to a considerable extent, pressed back through the violence of the spasm, which is induced by the attempt to feed it.

In consequence of imperfect nutrition the infant rapidly wastes away. There is no other disease, except the diarrhœal affections, in which emaciation is so rapid. In a case related by Dr. W. B. Lindsay in the *New Orleans Medical Journal*, Sept. 1846, the record states that "the infant was fat three days before, but was now emaciated." Romberg, whose knowledge of tetanus nascentium is derived mainly from European hospitals, and Dr. Robt. H. Chinn, of Texas (*New Orleans Medical and Surgical Journal*, Sept. 1854), both speak of the rapid emaciation. The trunk and extremities lose their fulness, and the features become pinched. Several observers have noticed the appearance of miliaria in this reduced state of system, especially around the shoulders, and sometimes a decidedly icteric hue appears on the skin.

The condition of the bowels is not uniform. Often they are loose, particularly if the disease is due to some irritation in the bowels; in other cases they are natural or constipated.

It is often difficult to ascertain the state of the eyes, since attempts to open the eyelids bring on spasms, and cause firm compression of the lids against each other. According to Sir Henry Holland one of the first symptoms which occurred in the cases on the island of Heimacy was strabismus, with rolling of the eyes. But this statement must be received with caution, since these cases were not seen by any physician, and the information was obtained from the parents and priests. If true, the proximate cause of the disease in Heimacy would seem to be located in the cerebro-spinal axis. I have seen the pupils contracted in the stage of collapse.

Mode of Death.—Death in tetanus nascentium may occur from asphyxia in the paroxysms, from extreme congestion of the cerebral vessels, or apoplexy; and lastly, it may occur from exhaustion. The last mode is probably the most frequent.

Prognosis.—All writers agree that tetanus nascentium rarely terminates favourably. Cullen attributes the ignorance of physicians, in reference to it, to the fact that it is so little amenable to treatment that they are not usually summoned to attend those affected with it. In the island of Heimacy, of one hundred and eighty-five cases, occurring during a series of years about the commencement of the present century, not one survived, and in the same locality, at a more recent period, according to the report of Dr. Schleisner already alluded to, sixty-four per cent. died. Similar testimony, in regard to the mortality of tetanus nascentium, is given by physicians in the Southern States. Dr. H. O. Wooten, of Alabama, says (*New Orleans Medical Journal*, May, 1846) that he has "never seen a decided case of tetanus nascentium that did not prove fatal, * * * and that it is very generally deemed useless to call in medical aid after the initiatory symptoms are well declared. Mr. Maxwell, speaking in reference to the West Indies, says (*Jamaica Physical Journal*, copied into the *London Lancet*, April 11th, 1835): "From observations, which I have made for a series of years, * * * I found that the depopulating influence of trismus nascentium was not less than twenty-five per cent. It scarcely has a parallel within the bills of mortality." Dr. D. B. Nailer (*New Orleans Medical Journal*, Nov. 1846) says: "About two-thirds of the deaths among the negro children are from this disease, and so uniformly fatal is it that a physician is never sent for."

Yet death does not always result. Eight of the forty cases in my collection recovered, but a correct opinion cannot be formed from this of the actual ratio of favourable to unfavourable cases, since recovery is so remarkable that favourable cases are much more likely to be published. In the histories of these eight cases two interesting facts are noticed, which, when present, may serve as a ground for hope of a successful termination. These were the age at which the disease began, and fluctuation in the symptoms. With two exceptions these infants were about a week old when the initiatory symptoms appeared, and there were fluctuations in the gravity of the disease; whereas fatal cases ordinarily grow progressively worse. Yet in favourable cases the symptoms are never so severe as they become in a few hours in those who succumb.

Duration in Fatal Cases.—Of eighteen cases observed by Finckh, in the Stuttgard Hospital, fifteen died in two days, two in five days, and one in seven days. During the epidemic in the Stockholm hospitals, in 1834, where forty-two cases were treated, the disease seldom lasted more than two days. Romberg says: "It generally lasts from two to four days, but its duration is at times limited at from eight to twenty-four hours, and occasionally, though rarely, it extends from five to nine days."

In thirty-one fatal cases in my collection in which the duration is mentioned—

One lived	three hours.
Eleven others lived	one day or less.
Twelve " "	two days.
Four lived	three "
Three "	four "

Both Underwood, who published a little treatise on diseases of children in 1789, and Dr. Elsasser, at a more recent date, record fatal cases which were unusually protracted. The one described by Underwood was treated in the British Lying-in Hospital, and although all the others treated in this institution died by the third day, this lived six weeks; but it is suggested by the author that death was due, in part, to some other affection. The child treated by Elsasser lived thirty-one days.

Duration in Favourable Cases.—In the eight favourable cases in my collection, the duration of the disease, reckoned from the time when the infant ceased nursing till it began again, was as follows: In one case, two days; in one, a few days; in one fourteen days; in two, fifteen days; in one twenty-eight days; in one, thirty-one days, and in the remaining case about five weeks.

Diagnosis.—A physician, in one of the Southern States, some years ago expressed the belief that tetanus nascentium is often not recognized by practitioners in the northern part of the Union, so that it is more frequent with us than would appear from the bills of mortality. This is in a measure true. I have known it to occur in this city, and its true character not be suspected, although the means of diagnosis are more patent and reliable than in most other infantile affections. Permanent rigidity of the voluntary muscles, with temporary exacerbations, such as have been described above, induced by attempts to open the mouth or eyelids, is pathognomonic.

Preventive Treatment.—While tetanus nascentium, if fully developed, is ordinarily fatal in spite of any remedial measures heretofore used, there is no doubt that great benefit may be gained by preventive measures in localities where the disease is common. This was shown by the great reduction in mortality in the Dublin Lying-in Hospital through the thorough ventilation introduced by Dr. Clarke. Dr. Meriwether, of Montgomery, Ala., says (*American Journal of Medical Sciences*, April, 1854): "When the disease appears endemically on a plantation, it may be arrested by having the negro houses whitewashed with lime inside and out, by raising the floors above the ground, by removing all filth from under and about the houses, by particular attention to cleanliness in the bedding and clothes of the mother, and in the dressing of the child, so as to prevent any of the matter from the umbilicus lying long in contact with the skin." Many physicians, especially in the Southern States, speak confidently of care in dressing the cord and attention to the umbilicus as a means of prevention. In the *New Orleans Medical and Surgical Journal*, July, 1853, Dr Grafton says that he has "never known the disease to occur in any child whose navel had the turpentine dressing." He uses turpentine as follows: "At the first time a few drops of the undiluted turpentine is applied immediately to the umbilicus around the cord, and it is anointed at every succeeding dressing, the turpentine being diluted one-half or two-thirds with olive oil, lard, or fresh butter." This use of turpentine has also been recommended by other practitioners in the warm regions.

Dr. John Furlonge, of St. John's, Antigua, believes (*Edinburgh Medical and Surg Journal*, Jan. 1830) that no case would occur with the following treatment: "The cord when divided should be wrapped in clean linen. Every night for two weeks one or two drops of tinct. opii and spts. vini, equal parts, should be given, and castor oil with a little magnesia every morning. The child must be washed in tepid water every morning and the funis dressed." If this treatment is attended by the success claimed for it by Dr. Furlonge, so great care is certainly well repaid where a large proportion of the infants die of tetanus as at Antigua.

Some experienced observers go so far as to assert that it is possible to ward off the disease after the occurrence of symptoms which they believe are premonitory. Dr. Dowell says (*American Journal of the Medical Sciences*, January, 1863): "Some with slight twitchings of the muscles have recovered without any trouble, by being put in a mustard bath, washed clean, and put in a clean and well-ventilated cabin."

Treatment.—In considering the treatment of tetanus nascentium, the great difficulty which the child experiences in swallowing should be borne in mind. Without care, a considerable part of the dose is lost by the spasm of the muscles of deglutition, which ordinarily occurs when the spoon is placed in the mouth; so that, without special attention to this matter, it may be uncertain whether the dose ordered is actually administered in full.

The treatment adopted by different physicians in this disease has been very diverse. Antiphlogistic remedies were employed by Finckh, but every case so treated was fatal. He states that whenever blood was abstracted, even in small quantity, the symptoms were aggravated. The result in the practice of other physicians, who have resorted to depletion, has been equally unsatisfactory.

The internal remedies which have been most frequently prescribed are opiates and antispasmodics. Furlonge, in a favourable case, gave laudanum in doses of one drop every three hours, alternately with two grains of Dover's powder. Woodworth also gave one-drop doses of laudanum; Eberle, one-sixth of a drop hourly. The opiate has generally been given in combination with an antispasmodic. The Dover's powder, given every three hours by Furlonge, was combined with five grains of sulphate of zinc. The hourly doses of laudanum, by Eberle, were combined with six drops of tincture of assafœtida.

When anæsthetics began to be employed in the treatment of diseases, it was believed that they would be especially useful in cases of tetanus. Accordingly, chloroform has been used in tetanus nascentium, with the effect of controlling the spasms during the time of its use, but without curing the disease. In Case 7, in the first table, it was employed several times, but apparently without delaying the fatal result. The editor of the *New Orleans Medical and Surgical Journal* states, in the May issue of that periodical for 1853, that he has used chloroform in tetanus nascentium, with the effect, he believes, of prolonging life. Anæsthetics certainly relieve the suffering of the infant, and on this account, even if they do not prolong life, their careful use is proper.

The administration of alcoholic stimulants is required, at short intervals, on account of the rapid emaciation and great prostration.

Local treatment directed to the umbilicus, in those cases in which there is evidence of inflammation of the umbilicus or umbilical vessels, should not be neglected. Vesication of the umbilicus, and the application of poultices to it, so as to promote discharge, have been followed by unquestionable benefit, if we may believe the statement of some observers who have made use of these measures. Dr. Meriwether, of Alabama, says, if there is no improvement from the medicine which he orders, he applies a blister larger than a dollar to the umbilicus, and with this treatment the child generally improves; a remarkable statement, since so few improve at all.

A warm foot-bath, repeated at intervals of a few hours, and stimulating embrocations along the spine, are proper adjuvants to the treatment.

In order to show what combinations of medicines have been used in favourable cases, we will mention briefly the treatment of the patients in our second table.

Case 1. Warm water and laudanum to umbilicus. ℞.—Magnes. calcinat. ℈j; tinct. assafœt. gtt. lx; tinct. opii gtt. xx.—M. Dose, 20 drops, occasionally. Sweet oil applied to the limbs.

Case 2. Took magnes. calcinat. on the first day. 4th day, quin. sulph. gr. iij; morph. sulph. gr. ss; axung. ʒj to ʒij; applied to navel. 5th day, tepid bath every three hours; castor oil dressing to umbilicus. 6th, same treatment continued, and from this time gradually recovered.

Case 3. 2d day, a large warm poultice to abdomen. ℞.—Tinct. cannabis Indic. ʒij; aq. camphor. ℥ij.—M. Dose, one teaspoonful every two hours. 3d day, treatment continued. 4th day, give same medicine every hour and a half. 5th and 6th days, treatment continued. 7th day, give same dose hourly. From this time recovered.

Case 4. 2d day, warm bath; poultice to abdomen. ℞.—Tinct. cannabis Indic. ℥ss; syr. pruni virgin. ʒjss.—M. Dose, one teaspoonful every two hours. 3d day, dose one teaspoonful hourly. 4th, 5th, and 6th days, treatment continued. 7th day, dose one teaspoonful every half hour. 8th, 9th, 10th, and 11th days, half an ounce of cannabis given daily. From this time recovered.

Case 5. 3d day, blister two inches square to umbilicus, also blister to occiput. Hyd. chlor. mit. gr. iij, followed by castor oil. ℞.—Tinct. opii gtt. $\frac{1}{6}$; tinct. assafœt. gtt. vj; hourly. 4th and 5th days, treatment continued; is improving. 6th day, omit other medicine; give castor oil. 8th day, symptoms worse; blister to umbilicus. Give tinct. opii and tinct. assafœt. as before. ℞.—Hyd. chlor. mit. gr. ij, to be given with rhubarb and followed by castor oil. From this time gradually recovered.

Case 6. At first castor oil internally and warm applications externally, then a dose of calomel and jalap; a warm bath every three hours. 2d day, tinct. opii gtt. j every three hours; frequent applications of warm laudanum to the jaws; turpentine and mercurial ointment to be applied to the navel, from which the cord has dropped; the nape of the neck to be blistered, and the following powder to be given between each dose of the laudanum: ℞.—Pulv. Doveri gr. ij; zinci sulph. gr. v. 3d day, some improvement; a small quantity of camphor to be added to each powder; the blistered surface to be dressed with turpentine and mercurial ointment. This course of treatment was continued more or less regularly for three weeks. On the tenth day he took one grain of calomel and half a grain of James's powder. During the entire sickness only three grains of calomel were administered.

Case 7. This child recovered without medicine, being kept on the side, so as to remove pressure from the occiput.

Case 8. Recovered without treatment, except the use of mild laxative powders in the beginning of the disease.

It is probable that some of the remedial measures made use of in the foregoing cases were useless, and they may occasionally have been positively injurious; but as, in therapeutics, experience is our only safe guide, it is our duty to examine carefully the treatment of those who recover in a disease so generally fatal as tetanus nascentium. It is obvious that a physician called to a case should attempt to remove all those agencies or conditions which are known to produce tetanus nascentium, or at least to favour its development, and which, when present, may serve to aggravate the disease. This requires attention to the state of the bowels and umbilicus, to cleanliness of the infant, of the bed and room, and to ventilation. It is only when this is done that we can hope for any good result from the internal and local treatment recommended above.

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ART. III.—*On the Use of Chloroform as an Internal Remedy.*

By A. P. MERRILL, M. D.

SINCE the publication of my *Lectures on Fever*, in which I have made frequent reference to the use of chloroform internally, I have received numerous inquiries upon the subject, which can best be answered, perhaps, by publishing more in detail some of the cases in which I have employed the remedy.

When it comes to be acknowledged, as I have little doubt it will be, that certain ailments commonly called blood diseases, are to be promptly relieved by a remedy which is supposed to act specifically upon the nervous system, there may be reason for revising some of the favourite doctrines of modern teachers. And when vascular engorgements are found to be more under control of neurotic remedies than the lancet, it will afford pathologists an apology for reconsidering certain dogmas hitherto well received. We may even venture to hope, that after the proper effects of chloroform are ascertained, better discriminations will be made in certain diseases between cause and effect. Fever, local congestion, and other forms of disease affecting the circulation of the blood, secretion, absorption, and nutrition may be traced to causes acting primarily upon the nervous system, the changes resulting to fluids and solids taking their places in the category of secondary effects.

But the true value of chloroform as an internal remedy, and the changes in theory and practice to be effected by its use, must be determined by more extended observations. I have witnessed its remedial effects in a sufficient number of cases to justify me in laying the subject before the profession, and with the hope that it may become the instrument of important improvements in therapeutics. It may not be too extravagant to expect the most beneficial effects from it in the inceptive stage of all forms of congestion from any cause whatever. When arising from the influence of local irritants, as in gastric engorgement, worms, teething, &c., it must of course be expected, that the relief obtained will not be permanent without the removal of the cause. But there is good reason to believe, that